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Low E Applications in Hawaii

Aloha!



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History



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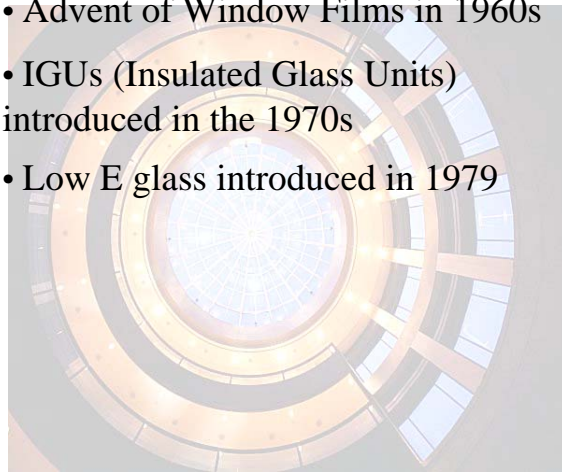
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- Advent of Window Films in 1960s
- IGUs (Insulated Glass Units) introduced in the 1970s
- Low E glass introduced in 1979



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SKY LIGHTS
OF HAWAII

- Low Emission Glass

- A spectrally selective glazing system using a microscopic layer of a metal coating applied to the inside face of the outer of two layers of glass to reduce heat exchange across the air space between the two layers and reflecting that energy back to it's source.

- Benefits

-Reduces transmission in the ultraviolet and infrared wavelengths, but allows visible light spectrum to pass through

-Has sound insulation properties



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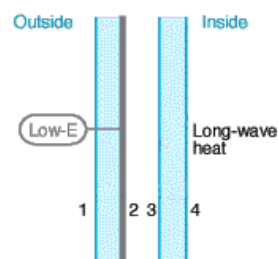
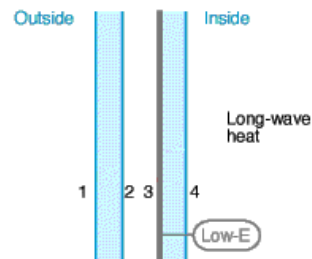
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SKY LIGHTS
OF HAWAII



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SKY LIGHTS
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- Low Emission (E2) Solar Control Glass

- Also reflects portions of infrared and ultraviolet rays but with higher visible light transmittance (VLT)

- Benefits

- Reduces transmission in the ultraviolet and infrared wavelengths, but allows more visible light spectrum to pass through



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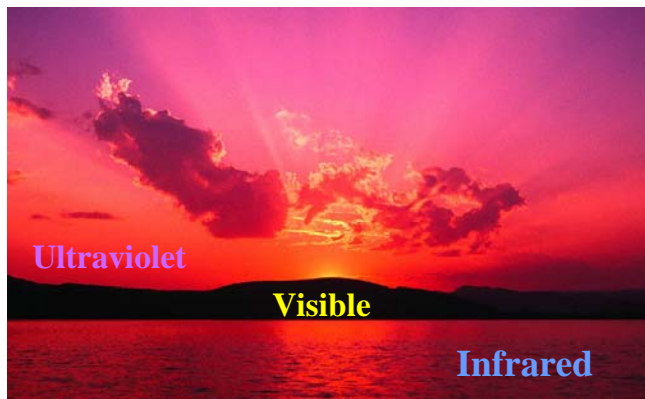
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SKY LIGHTS
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- Sunlight: Electromagnetic Spectrum

- Three classes of visible spectrum wavelengths, photons measured in nanometers:



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•UV (Ultra-violet)

- below 400 nanometers, shorter waves
- Up to 99% absorbed by the atmosphere's ozone layer
- Most energetic and destructive form of light
- Divided into three general bands-
 - UV A - "dark light", ages skin, Vitamin D
 - UV B - cancerous, skin and eye cell damage
 - UV C – most dangerous, damaging

All can increase photochemical deterioration,



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•Visible

- between 400-700 nanometers
- visible spectrum, from Violet to Red
- some heat and uv radiation in this segment
- Human eye's iris directs light to rods and cones, each of which perceive the specific wavelength of light suited to them; the eye responds more to green light (500 nm) than to the red (700 nm).



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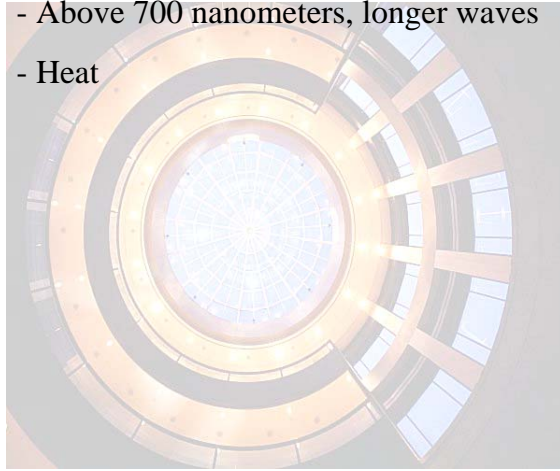
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SKY LIGHTS
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•Infrared

- Above 700 nanometers, longer waves
- Heat



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SKY LIGHTS
OF HAWAII

•Emissivity

-Ratio of energy absorbed to energy radiated.

Black body $e = 1$, any real object $e < 1$

•U-value

- The lower a u-value, the better it performs in preventing heat loss/gain

•R-value

- The lower a u-value, the better it performs in preventing heat loss/gain

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SKY LIGHTS
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•SHGC

- Solar Heat Gain Coefficient
- High solar gain in heating-dominated climates
- Low solar gain for use in cooling-dominated climates

•Visible Transmittance

- The conveyance of mid-range light
- Average glass allows 100%

Therefore- $SHGC < VT$ or $VT/SHGC > 1$



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SKY LIGHTS
OF HAWAII

•Shading Coefficient

- The ability of a glass to block the sun's radiant heat
- The fraction of solar radiation passing through to the total amount of radiation falling on a 1/8 pane of clear glass
- Therefore the lower the SC, the lower the solar heat gain



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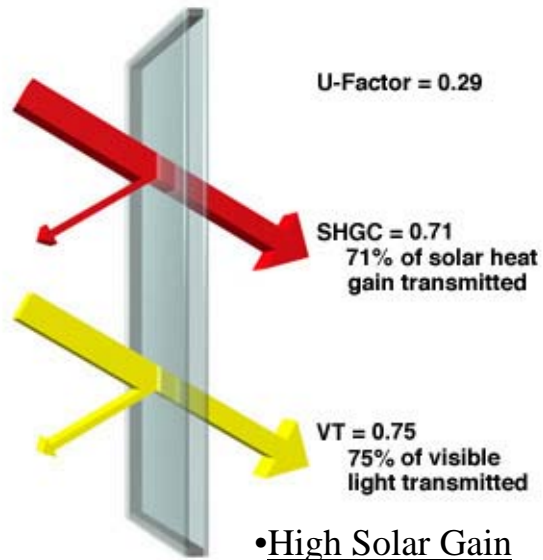
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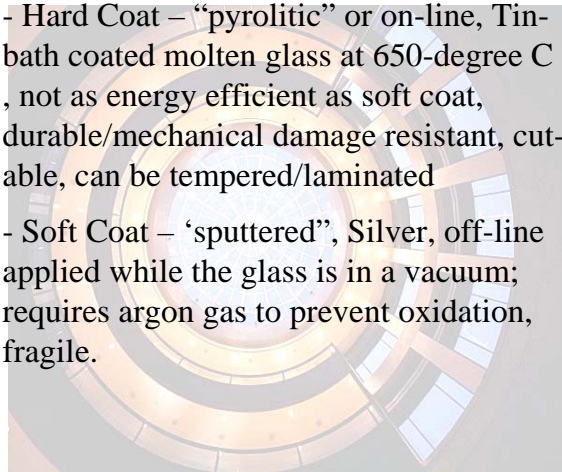
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•Coatings

- Hard Coat – “pyrolitic” or on-line, Tin-bath coated molten glass at 650-degree C , not as energy efficient as soft coat, durable/mechanical damage resistant, cut-able, can be tempered/laminated
- Soft Coat – ‘sputtered”, Silver, off-line applied while the glass is in a vacuum; requires argon gas to prevent oxidation, fragile.



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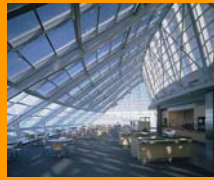
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SKY LIGHTS
OF HAWAII

•Windows

- Best used on east and west facades
- The larger the window area, the lower SC or SHGC and lower VLT to reduce glare
- Can be combined with exterior awnings, eaves and such, with at least .2 to .8 SC to be effective
- Be attentive to footcandle/light loss. The average light at a window is 100-5000 FC, 12' in can reduce to 250-350 FC, standard offices need 50 fc, gyms 100,



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SKY LIGHTS
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•Skylights/Roof Windows

- Best used on north-facing roof flanks
- The larger the skylight area, the lower SC or SHGC and lower VLT to reduce glare
- Natural light should not exceed 10% of floor area of a room if not mitigated
- Roof receives as much as 10,000 FC/SF! Meter energy intake accordingly-

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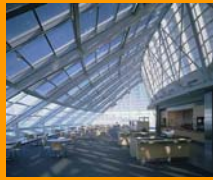
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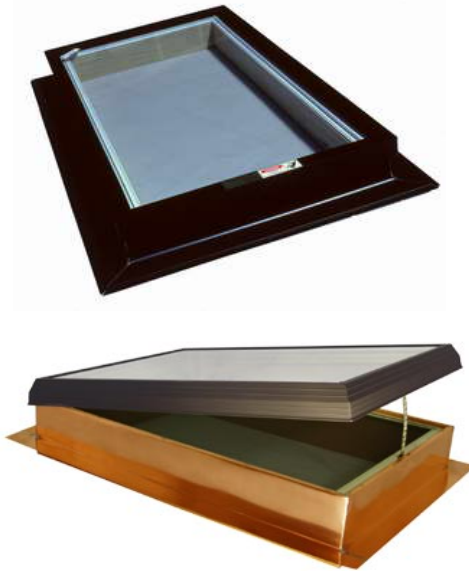
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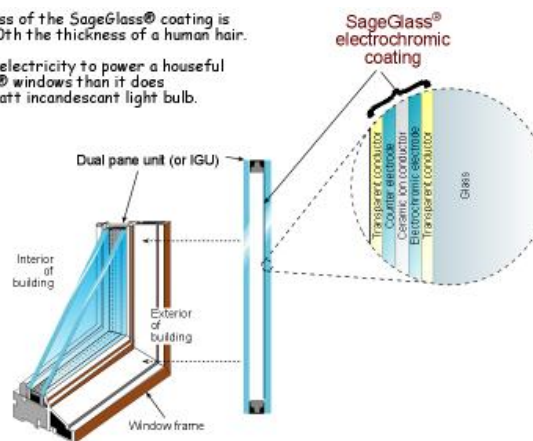
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SKY LIGHTS
OF HAWAII

Total thickness of the SageGlass® coating is less than 1/50th the thickness of a human hair.

It takes less electricity to power a houseful of SageGlass® windows than it does to run a 40-watt incandescent light bulb.



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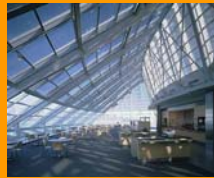
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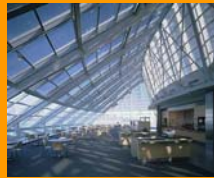
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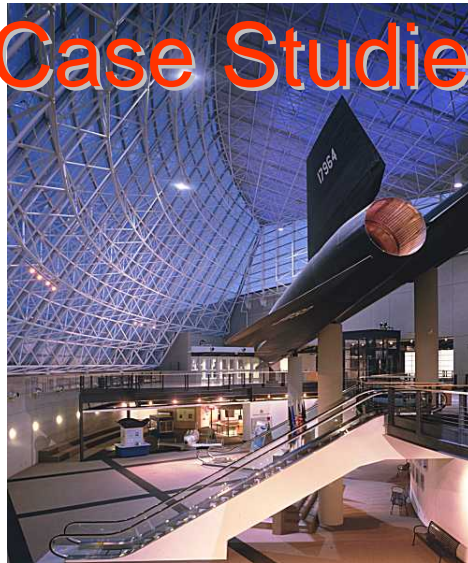
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•4443 Aukai Avenue

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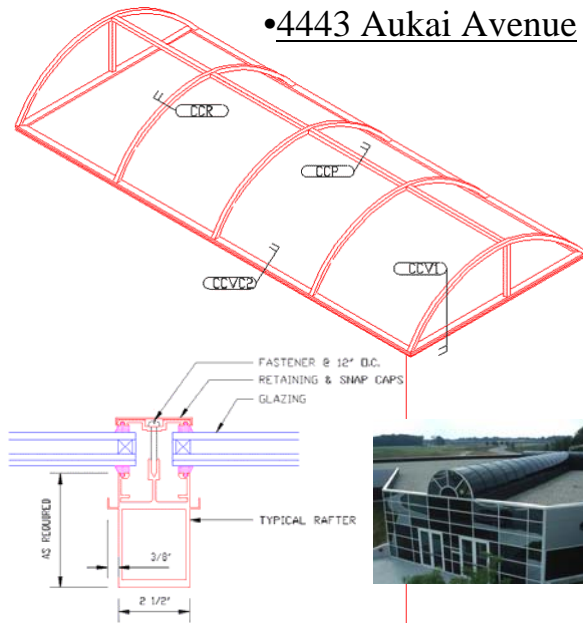
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•4443 Aukai Avenue



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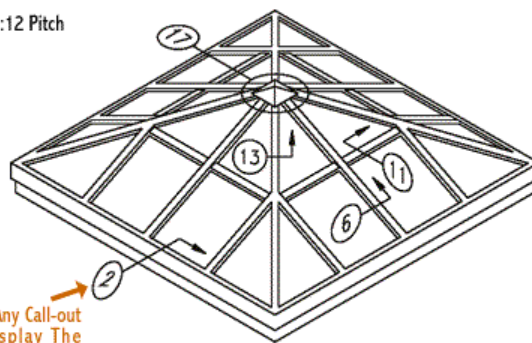
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SKY LIGHTS
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Min. 3:12 Pitch



•604 Ala Moana Boulevard

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SKY LIGHTS
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• 41-467 Hihimanu St

Waimanalo, HI



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SKY LIGHTS
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•1801 Kalakaua Avenue



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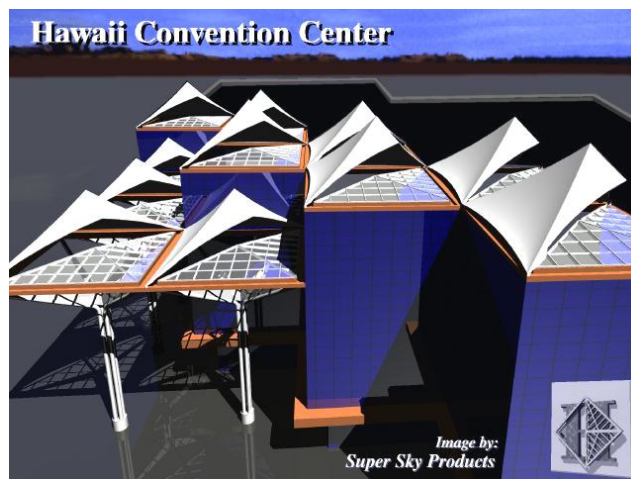
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• 64-1550
Kamehameha
Highway



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- Apply high performance glazing in their most optimal installation types based on climate and use
- Adhere to the recommendations in the Model Energy Code, International Energy Conservation Code, etc...
- Use daylighting systems as a tool for healthier living, meeting, and work spaces
- Life cycle cost analysis vs value engineering

